UUI: Reusable Spatial Data Services in Unified User Interface at NASA GES DISC

http://disc.gsfc.nasa.gov/uui/

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GES DISC is a data center that provides access to large-scale archives of earth science data.

Also applications and services built on top of the data.
Going forward

Unified User Interface

Context (space, time, data, keywords...)

Information | Visualization | Subset | Search

Data

GUI

Data Services

Data Archive
Unified User Interface (UUI)

Search/find/navigate ANY DATA RESOURCE, while retaining CONTEXT for cross-resource SEAMLESS NAVIGATION:

- Data granules
- Data subsets (in bulk)
- Data visualization in/from Giovanni
- Data Documentation
- Dataset Landing Pages
Data access and available services
Services

- Build around a notion of web services
  - Small, self-contained, web-accessible building blocks
  - Can be reused and chained to build more complex services

- Each service provides a well-defined specification
  - Allows for an easy verification, integration, maintenance
  - JSON WSP as a main vehicle, enhanced based on …
  - OpenSearch / GEO and OGC WPS recommendations

- Legacy services wrapped in JSON WSP
Architecture

Web Page

User Actions

AngularJS

Content View

JSON WSP request

JSON WSP response

Node.js

Web Server, Built-in services

Query

JS Objects

Mongo DB

Database

Legacy Service wrappers

OPeNDAP
SSW
Giovanni

CMR, Legacy metadata

Metadata
**JSON WSP**

**JavaScript Object Notation Web-Service Protocol**

### Specification

```json
{ "type": "jsonwsp(description",
  "version": "1.0",
  "servicename": "Keywords service",
  "url": "http://disc.gsfc.nasa.gov/uui/service/keywords/jsonwsp"
"methods": {
  "getSynonyms": {
    "doc_lines": ["Returns synonyms"]
  "params": {
    "keyword": {
      "doc_lines": ["a keyword"],
    "type": "string",
    "optional": false
  }},
  "ret_info": {
    "type": ["string"]
  }}
```

### Request (POST)

```json
{ "type": "jsonwsp/request",
  "version": "1.0",
  "methodname": "getSynonyms",
  "args": {
    "keyword": "AOD"
  }
}
```

### Response

```json
{ "type": "jsonwsp/response",
  "version": "1.0",
  "servicename": "Keywords service",
  "method": "getSynonyms",
  "result": ["AOT",
             "Aerosol Optical Depth"]
}
```

- **Request params named based on OpenSearch/GEO**
  - start, end, box, etc

- **Response is formatted based on OpenSearch as well**
  - totalResults, startIndex, items etc.
Service interaction – OGC WPS

Synchronous Job

Asynchronous Job

Source: OGC® WPS 2.0 Interface Standard
Service composition and reuse

- Services are simple POST calls with parameters in => results out
- Easy to wrap as a function in many languages supporting JSON (JavaScript, Python, Perl, etc.)
- Wrapper function can be used as a building block to construct complex services
  - ... Search for data
  - Then Subset the data
  - Then Process the data
  - Then Plot the data ...
Reuse by External Clients

- Easy for external clients to consume services and build composite applications
- Don’t need to know internal protocols and APIs of GES DISC applications
- Implement a single API - use with any service
Challenges and limitations

- Lack of means for automatic discovery and reuse in JSON WSP
  - Lacks semantic information (some relief in OpenSearch GEO)
  - Can’t specify acceptable required/optional combinations for args
  - Needs better customization

- Rigid communication protocol in OGC WPS
  - Does not specify retrieval of intermediate results
  - Can not process / display results of long-running jobs until complete (no piping)
Summary

• New interface provides a simple and modern user experience, replacing and integrating with a number of legacy data services and applications at GES DISC

• Service-based implementation takes advantage of modern technologies and standards
  • High maintainability, evolvability, and forward compatibility

• Services are easy to reuse by partner applications
  • Search, Subset, Regrid, Format
  • Visualization (coming soon)